IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF TEXAS
HOUSTON DIVISION

FISHER-ROSEMOUNT SYSTEMS, INC. And EMERSON PROCESS MANAGEMENT LLLP, **Plaintiffs,** **vs.** **ABB LTD, ABB INC., ABB AB, and ABB AUTOMATION GMBH,** **Defendants.**	**Case No. 4:18-cv-00178-KPE** **JURY TRIAL DEMANDED**

DEFENDANT ABB INC.'S TECHNICAL TUTORIAL

Pursuant to the Court's Scheduling Order (Dkt. 104), Defendant ABB Inc. submits the following tutorial discussion concerning the subject matter of the patents in issue: U.S. Patent No. 8,332,567 ("the '567 Patent," Appx3-34[1]), U.S. Patent No. 9,411,769 ("the '769 Patent," Appx589-629), and U.S. Patent No. 7,684,875 ("the '875 Patent," Appx985-1002) (collectively, "the Emerson Patents").

All three of the Emerson Patents describe "process control systems," which are simply systems that automate the control of a process (rather than requiring manual control of the process by a human). (*See* Appx3, Appx589, Appx985, Appx1498.) Early, simple forms of process control systems date to the third century B.C., when Ktesibios of Alexandria invented float valves to regulate the water level of water clocks. (Appx1498.) Process control systems to regulate

[1] All citations in this technical tutorial refer to the consecutive page numbers ("Appx__") that have been added to the center of the bottom margin of each page of the Appendix filed herewith.

temperatures were created as early as 1620, and systems to control pressure inside a vessel were implemented as early as 1681. (*Id.*) Later, process control systems were used by Henry Ford and others to automate manufacturing processes. (Appx1499.) Naturally, many present-day process control systems utilize the power of computers to quickly and efficiently measure, regulate, and control various operations or devices. (*Id.*)

One modern, everyday example of a process control system is the heating, ventilation, and air-conditioning ("HVAC") system found in nearly every building. Rather than requiring human intervention and manual control to turn HVAC systems on or off every time the building gets too hot or too cold, such systems employ thermostats that make temperature measurements, compare those measurements to set points, and then supply signals to the HVAC systems to control their operation (e.g., turning various HVAC systems on or off). Another familiar example of a process control system is an automated sprinkler system used to control watering of landscaping, rather than requiring a user to manually water plants or set-up and move sprinklers.

The '567 Patent was the first of the three Emerson Patents to be filed. (Appx3, Appx137.) By this time, in 2006, simple process control systems had been known and used for centuries, and even highly complex process control systems using the processing power of computers had been known for decades. For example, during prosecution of the Emerson Patents, the Patent Office cited relevant prior art dating back to 1999. (Appx3-4 (References Cited), Appx589-591 (References Cited), Appx985 (References Cited).) Emerson itself presented the Patent Office with relevant prior art dating back to 1992. (*Id.*)

The Emerson Patents describe process control systems that existed prior to Emerson's alleged inventions. For example, the '567 Patent describes process control systems that include field devices coupled to a process controller "via one or more I/O cards" and a "communication

medium, such as a 2-wire cable, a wireless link or an optical fiber." (Appx19 at 1:55-58.) In such a system, each field device is connected to the process controller through its own wire (or other communication medium). (*Id.*) The '567 Patent further describes these prior art process control systems utilizing a plurality of wires that would be connected to the controller. (*Id.* at 1:57-67.)

The '567 Patent touts the use of a "universal I/O bus." (*See, e.g.*, Appx20 at 4:46-67.) A bus is simply "a circuit that connects the CPU with other devices in a computer." (Appx1506 (seventh definition of "bus").) According to the '567 Patent, the wires from each of the field devices could be coupled to a bus, rather than wired directly to the process controller. (*See, e.g.*, Appx20 at 4:46-67, Appx23 at 9:21-43.) This would, according to the '567 Patent, "substantially reduce" the number of wires needed to transmit information from a field device to the controller, and vice versa. (Appx23 at 9:21-43.)

In the original application for the '567 Patent, Emerson sought to claim its alleged invention as an apparatus to connect field devices to a controller in a process control system having the following features (Appx109):

> a first interface configured to receive first information from a field device using a first communication protocol;
>
> a communication processor communicatively coupled to the first interface and configured to encode the first information for communication via a bus using a second communication protocol; and
>
> a second interface communicatively coupled to the communication processor and the bus and configured to communicate the first information via the bus using the second communication protocol, wherein the bus is configured to use the second communication protocol to communicate second information associated with another field device.

Claims to a "machine accessible medium having instructions stored thereon" and a "method to communicate information between a controller and field devices in a process control system" having similar features were also presented. (Appx111 (original claim 10), Appx113 (original claim 20).)

These claims of the original application were rejected as lacking novelty under 35 U.S.C. § 102, as well as for being directed to ineligible subject matter under 35 U.S.C. § 101. (Appx160-171.) For example, the Patent Office identified a prior art patent application by Wiemeyer that taught all of the elements of the claims. (Appx163; *see also* Appx1196-1125.) The Patent Office found that Wiemeyer already described and disclosed a process control system that had a first interface to receive information from a field device using a first communication protocol, a processor to encode the information using a second communication protocol, and a second interface and a bus to communicate the information using the second communication protocol, along with all of the other elements of the 41 claims then pending. (Appx163-171.)

Emerson then presented amended claims to the Patent Office in which the first interface was specifically configured to receive both "analog-encoded information and digital-encoded information" from the field device, and also to perform an "analog-to-digital" conversion if the information was analog in format. (*See, e.g.*, Appx223 (claim 1).) Emerson contrasted these amended claims with the Wiemeyer reference, arguing that the "various modules described by Wiemeyer et al. include a digital input module separate from an analog input module but not a single module configured to receive analog-encoded information and digital-encoded information having a processor to perform an analog-to-digital conversion on first information in response to determining that the first information is analog encoded." (Appx237.)

Thus, Emerson amended the claims to include the additional requirement that a single module could receive both analog and digital information from a field device. This feature, Emerson argued, distinguished its claims from the Wiemeyer reference: although Wiemeyer described a process control system using modules, Wiemeyer had separate digital modules and analog modules, according to Emerson. (*Id.*)

The Patent Office rejected all of the claims again. (Appx273-282.) The Patent Office found all of the claims were obvious under 35 U.S.C. § 103 in view of the combination of Wiemeyer and another prior patent application by Odom. (Appx275-282; *see also* Appx1226-1333.) In particular, the Patent Office found that these two references together taught all of the features described in the patent claims and would have been obvious to combine. (Appx275-282.) According to the examiner, Odom specifically taught the use of modules that could receive both analog and digital information in a process control system. (Appx276-277.)

In response, Emerson again amended the claims of the pending application for the '567 Patent. Claim 1 was amended to require a first termination interface that was coupled to "different types of field devices" and exchanged communications with the field devices "via a plurality of different communication protocols." (Appx296.) Emerson also amended the pending claims to require a processor that could "encode first information from any of the different types of field devices." (*Id.*) Moreover, in an attempt to further differentiate the pending claims from the Wiemeyer and Odom prior art references, Emerson replaced the requirement that a single module could receive both analog and digital information with the requirement that a single module could communicate with "*any* of the different types of field devices" by using "different communication protocols." (*Id.*)

Despite adding these further limitations to the pending claims, the Patent Office again rejected all of the claims as lacking novelty under 35 U.S.C. § 102. (Appx324-337.) According to the Patent Office, all of the features of most of the amended claims were expressly taught in the prior patent application submitted by Odom (Appx328-332), while the additional features of claims 2, 5-8, 17-19, and 26 were taught in several other prior art references that would have been obvious to combine with Odom (Appx332-337).

Emerson amended the claims once again. In this amendment, Emerson added the requirements that the device include both a "base" and a "module," and that the module must be "removably attachable" to the base. (Appx348-356.) Emerson further specified that the claimed interface (to couple to the different types of field devices) was part of the base, rather than a part of the removable module. (*Id.*) The '567 Patent describes the module communicating with field devices via the base and, specifically, a "field device interface" forming part of the base. (Appx25 at 14:1-30.)

Emerson contrasted this amended arrangement from that described in the Odom prior art. (Appx364-366.) Emerson recognized that Odom described a process control system that included field devices, a base, and modules. (Appx364.) However, Emerson asserted that the field device interface of Odom was physically a part of the module, rather than integral with the base, as now required by the claims. (Appx364-365.) Emerson alleged that, "[i]nstead, Odom et al. describe that the measurement module (or cartridge 108) connects directly to sensors and devices through its terminals (301)." (Appx365.) In Odom, there was no wiring or connection within the base that connected the module to the field device. (*See, e.g.*, Appx1229, Appx1234-1235, Appx1285-1286, Appx1289-1290.) The communication pathway between the module and the field device was complete without going through the base. (*See, e.g.*, *id.*)

These further amended claims were also rejected by the Patent Office. (Appx382-397.) In the next Office Action, the Patent Office found that the subject matter of most of the further amended claims was obvious over the combination of Odom and a prior art patent issued to Swales (Appx385-392; *see also* Appx1334-1346), while the additional features of claims 5-8, 17-19, and 26 were taught in several other prior art references that would have been obvious to combine with Swales and Odom (Appx392-397).

In response to this rejection, Emerson amended the pending claims yet again. (Appx432-440.) Emerson admitted that the Swales prior art described a base and a module, but argued that the module connected "directly to" the master device, or controller, and did not connect to the controller "through a physical interface" of the base. (Appx448-450.) In response to an additional rejection of their amended claims as obvious over Swales and another prior art patent issued to Lake (*see* Appx457; *see also* Appx1347-1374), Emerson repeated its arguments concerning Swales and further argued that the modules of Lake (like Odom) communicated directly with field devices via their own interfaces, rather than connecting to field devices through a physical interface of the base. (Appx502-504.) It was only after Emerson made these final sets of amendments and arguments that the Patent Office ultimately issued the '567 Patent. (Appx527-539.)

The '769 Patent is a continuation-in-part of the '567 Patent just discussed. (Appx589, Appx610 at 1:8-14.) That means that the '769 Patent includes the subject matter of the '567 Patent, but added new subject matter that was presented for the first time in the application filed January 8, 2015. (*Compare, e.g.*, Appx605-608 (Figures 13A-15), Appx624-627 (30:31 to 36:17) *with* Appx3-32.) The original claims filed in the application for the '769 Patent included many of the same requirements as the issued claims of the '567 Patent, as well as certain new limitations. (Appx727-732, Appx753-757; *compare* Appx32-34.)

Nonetheless, the Patent Office rejected nearly all of the claims originally presented in the application for the '769 Patent as obvious over prior patent applications to Steger and to Apel, as well as additional prior art references. (Appx801-816; *see also* Appx1375-1497.)

In response, Emerson amended their claims to emphasize that the same module could communicate (through an interface of the claimed base) with multiple field devices using multiple, *different* communication protocols. (Appx864-868.) Emerson distinguished Steger and Apel as teaching modules that communicated with field devices using only one communication protocol. (Appx870-871.) For instance, Emerson argued "each measurement module [of Steger] is associated with a particular protocol" and "Apel mentions different communication protocols; however, these are implemented in separate I/O devices." (*Id.*) Based on these amendments and arguments, the Patent Office issued the '769 Patent. (Appx901-908.)

The '875 Patent allegedly describes a new software application—a computer program—implemented on a conventional process control system. The specification describes applying "tags" to "process control devices" (apparently, the same devices found in the '567 and '769 Patents called "field devices") so that they can be matched to the right control program. (*See, e.g.*, Appx985 at Abstract; *see also* Appx999 at 14:40-56.) The alleged invention "obtain[s] a tag of a process control device" from a connected "input/output device" that it then uses to look up the correct control program. (Appx985 at Abstract.)

In this sense, the '875 Patent describes nothing more than an old-fashioned label gun to label each field device with a distinct tag so that an operator can more easily associate each field device with the applicable control program. The difference is that the '875 Patent describes using a computer to match tagged field devices to control programs instead doing a manual match. As

the '875 Patent explains, the "field device tags" are used "to automate the association of field devices" to particular programs. (Appx984 at 3:18-21.)

Emerson's originally filed claims sought to cover any method that obtained a tag and then "associate[d] the process control device [i.e., field device] with a process control module [i.e., control program] based on the obtained tag." Original claim 1 read as follows (Appx1029):

> 1. A method comprising:
>
> obtaining a tag of a process control device from an input/output device; and
>
> associating the process control device with a process control module based on the obtained tag.

The Patent Office rejected original claim 1, as well as all of the '875 Patent's other original claims, as obvious in light of the prior art. (Appx1104-1109.) In response, Emerson narrowed the claims to require that the computer program perform several additional steps, including "querying" a database "based on a tag obtained from an input/output device." (Appx1126-1132).) For example, original claim 1 was re-written as follows (Appx1126):

> 1. (Currently Amended) A method comprising:
>
> communicatively coupling a process control device to a channel of a multi-channel input/output port of a process controller via an input/output device;
>
> obtaining a tag [[of a]] for the process control device from [[an]] the input/output device; ~~and~~
>
> querying based on the tag obtained from the input/output device a database of process control routines implemented by the process controller to identify a process control routine, the process control routine to control the process control device within a process plant; and
>
> communicatively coupling the identified process control routine to the channel of the multi-channel input/output port based on the database query.
>
> ~~associating the process control device with a process control module based on the obtained tag.~~

Notably, much of the language added to the claims by Emerson is not explained – and in some instances not even mentioned – in the '875 Patent. For example, nowhere does the specification of the '875 Patent describe "querying . . . a database of process control routines," based on a tag for a process control device or otherwise. (See Appx985-1002.) The '875 patent also fails to explain how both a process control device and a process control routine could be communicatively coupled to the same "channel of a multi-channel input/output port of a process controller." (*Id.*)

Even after these amendments, the Patent Office again rejected all of the claims. (Appx1141-1145.) In other words, the Patent Office found that Emerson had not invented the subject matter recited in the amended version of claim 1 reproduced above.

On December 16, 2009, Emerson further narrowed the pending claims so that they incorporated requirements of the dependent claims. (Appx1152-1161.) For example, Emerson rewrote original dependent claim 2 as an independent claim (which ultimately became issued claim 7) that incorporated not just additional limitations from its base claim, but also to include the additional requirement that a tag "obtained from the input/output device" "match[]" a second tag that already designated the relevant control program. (Appx1152-1153.) It was only following these further amendments to the claims that the Patent Office allowed the '875 Patent to issue. (Appx1171-1174.)

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Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing instrument was served on all counsel of record in accordance with the Federal Rules of Civil Procedure via electronic filing on this 25th day of September 2019 as follows:

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